SONY®

White paper

February 2015

Xperia™ E4 Dual

E2124

Purpose of this document

Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

NOTE: The illustration that appears on the title page is for reference only. All screen images and elements are subject to change without prior notice.

Document history

Version		
February 2015	First released version	Version 1
February 2015	Second released version	Version 2
March 2015	Third released version	Version 3
June 2015	Fourth released version	Version 4

Sony Mobile Developer World

For the latest technical documentation and development tools, go to *www.sonymobile.com/developer.*

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Product overview

Highlights

- 5-inch qHD Display with IPS for best viewing angle
- Large 2300mAh battery with Battery STAMINA Mode
- Quad-core 1.3 GHz processor with 1GB RAM and 8GB eMMC
- 5MP main camera with autofocus and flash and a 2MP front camera with selfie apps
- Sony audio technologies: xLoud™, ClearAudio+ and PartyShare app

Feel the quality
The Xperia™ E4 Dual focuses on durability and reliability without sacrificing style. The Xperia™ E4 Dual's 2300 mAh battery and power-saving modes ensure a two-day battery life, while a high-performance quad-core processor takes care of mobile device tasks, graphics rendering and touch control.

Enjoy large screen entertainment
The Xperia™ E4 Dual is equipped with a 5-inch qHD IPS screen (960x540 pixels) to deliver large screen entertainment with a wider viewing angle. And for an even better video and audio experience, the Xperia™ E4 Dual includes Sony's latest audio innovations such as ClearAudio+ and xLoud™.

Two-day battery
A powerful 2300 mAh battery and innovative power saving features give you an impressive two-day battery life. You never miss a notification or social network message. And you don't have to worry about charging your phone every night. Battery STAMINA Mode optimizes how your battery is used and you can decide which apps are kept running even when your Xperia™ E4 Dual is in sleep mode.

Straight to the fun
As soon as you swipe your screen, your favourite apps are there for you. Your pictures. Your music. Facebook™ and your network. When you need to turn on and off Wi-Fi® or roaming, the Xperia™ E4 Dual lets you do it in seconds with the Quick Settings tab. The Xperia™ E4 Dual is designed to make taking great pictures easy. With Auto scene recognition, image enhancing features and built-in camera apps, you get the best pictures with zero effort.

Music to make the party
At the park or at the party, the Xperia™ E4 Dual will impress. The speakers deliver audio clarity and depth that will surprise everybody and put your music in the middle of it all.

The Xperia™ E4 Dual comes with ClearAudio+, xLoud™, aptX®, Bluetooth®, Clear Phase™, Clear Bass™, Dynamic normaliser, Equalizer and the PartyShare app. PartyShare was developed by Sony to make sharing music with friends easy and fun. You can also use it to share photos.

Pictures to make you proud
The Xperia™ E4 Dual has a 2MP front camera, a 5MP rear camera with autofocus and flash, and the ability to record 30 fps video. The Xperia™ E4 Dual also comes with built-in photo and imaging apps such as Auto scene recognition, Portrait retouch, Timeshift burst, AR effect, AR fun, Live on YouTube, Social live, Creative effect, Sweep Panorama and Sound photo.

One phone. Two numbers

The Xperia™ E4 Dual supports the use of two SIM cards simultaneously. While speaking to a caller using the first SIM card and phone number, you can put the call on hold and answer an incoming call using the second SIM card and phone number. You can activate the dual SIM feature when you set up your phone the first time or via the Setup guide under the Settings menu.

Product specifications

Operating system	Google™ Android™ 4.4.4 (KitKat)
Processor	1.3 GHz MTK MT6582 Quad Core
GPU	ARM Mali-400 MP2
Size	137 x 74.6 x 10.5 mm
Weight	146 grams
Available colours	White Black
SIM card	Dual SIM
Main screen	
Colours	167,000 colour TFT
Resolution	960x540 pixels
Size (diagonal)	5 inches
Scratch-resistant	Yes
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 4 fingers supported
Memory	
RAM	1 GB
Flash memory	Up to 8 GB*
Expansion slot	microSD™ card, up to 32 GB
Camera	
Camera resolution	5 MP
Smooth zoom	4x
Video recording	Yes – 1080p
Front Camera	Yes – HD 720p for video chat and 2 MP for camera capture
Sensors	
Accelerometer	Yes
Proximity sensor	Yes
Ambient light sensor	Yes

Networks	
E2124	SIM 1: UMTS HSPA+ 850 (Band V), 1900 (Band II), 2100 (Band I) MHz GSM GPRS/EDGE 850, 900, 1800, 1900 MHz SIM 2: GSM GPRS/EDGE 850, 900, 1800, 1900 MHz
Data transfer speeds	
GSM GPRS	Up to 85.6 kbps
GSM EDGE	Up to 237 kbps
HSUPA (upload)	Cat 6, up to 5.8 Mbps
HSDPA (download)	Cat 14, up to 21 Mbps
Battery performance	
Talk time (GSM)	Up to 10 hours 24 min.**
Standby time (GSM)	Up to 552 hours**
Talk time (UMTS)	Up to 10 hours 24 min.**
Standby time (UMTS)	Up to 548 hours**
Music listening time	Up to 48 hours 26 min.**
Video playback time	Up to 6 hours 42 min.**
Battery (embedded)	2300 mAh minimum

Memory comprises approximately 3 GB of firmware plus 5 GB of "Internal storage" for music, pictures and movies, and downloaded applications and their data. For more details about memory, see "Memory in Android™ devices" on page 17.

** Values are according to the GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.

NOTE: Battery performance may vary depending on network conditions and configurations, and device usage.

NOTE: Performance metrics are measured under laboratory conditions.

Categorised feature list

Camera
5MP camera
4x digital zoom
AR Effect
AR Fun
Auto focus
Auto scene recognition
Creative effect
Face detection
Flash/Photo light
Geotagging
HDR for pictures
Image/Video stabiliser
Live on YouTube™ - by Xperia™*
Portrait retouch
Self-timer
Selfies
Send to web
Smile Shutter™
Social live*
Sound Photo
Sweep Panorama
Timeshift burst
Touch capture
Video recording (1080p)
White balance

Music
3D Surround Sound (VPT)
Album art
Bluetooth® stereo (aptX®, A2DP)
ClearAudio+
Clear Bass™
Clear Phase™
Clear stereo
Dynamic normaliser
Manual equaliser
PartyShare app
SensMe™
TrackID™ music recognition*
Walkman® application
xLoud™ Experience

Search
Bookmarks
Google Chrome™*
Google Play™
Google™ search*
Google Voice™ Search*
Google Maps™ for Mobile with Street view*
Web browser (WebKit™)*

Communication
Call list
Conference calls
Facebook™ application*
Google+*
Hangouts™*
Loud Speaker
Multiple IM
Twitter™ application*
Voice enhancement
Xperia™ Socialife*

Messaging
Conversations
Email
Google Mail™*
Handwriting recognition
Instant messaging
Multimedia messaging (MMS)
Predictive text input
Text messaging (SMS)

Design
Battery STAMINA Mode
Gesture input
Illumination effect
On-screen 12-key keyboard
On-screen QWERTY keyboard
Picture wallpaper
Screen capturing
Touch screen
Voice input
Wallpaper animation

Entertainment
DTV (Digital Television)
Media browser
PlayMemories*
Radio (FM radio with RDS)
Sony Entertainment Network**
YouTube™*

Organiser
Airplane mode
Alarm clock
Calculator
Calendar
Contacts
Setup guide
Stopwatch
Timer
World clock

Connectivity
3.5 mm audio jack (CTIA)
aGPS*
Bluetooth® 4.1 wireless technology
Media Transfer Protocol support
Micro USB support
Native USB tethering
Media Go™*
PC Companion
Smart Connect
Synchronisation via Facebook™
Synchronisation via SyncML™
Synchronisation via Google™
Synchronisation with computer
Synchronisation via Microsoft® Exchange ActiveSync®
USB High speed 2.0 support
USB mass storage
Wi-Fi®
Wi-Fi Direct®
Wi-Fi® Hotspot functionality
Wi-Fi CERTIFIED Miracast™

This service is not available in all markets.

** *Sony Entertainment Network with Music Unlimited is not available in every market. Separate subscription required. Additional terms and conditions apply.*

Technologies in detail

The information presented in this section is a general overview of the technology incorporated into the product. However, hardware and software levels of compliance to standards and specifications vary between products and markets. For more information, contact Sony Mobile Developer World or the relevant Sony representative.

Accessibility and Usability

Accessibility and Usability	
Talkback*	Yes, default is "off"
Captions*	Yes, default is "off"
Magnifications gestures*	Yes, default is "off"
Large Text*	Yes, default is "Not checked"
High Contrast Text*	No
Power button ends call*	Yes, default is "Not checked"
Auto-rotation*	Yes, default is "Checked"
Speak Passwords*	Yes, default is "Not checked"
Accessibility Shortcuts*	Yes, default is "off"
Text – to – Speech*	Yes
Touch and hold delay*	Yes, default is "Short"
Color Inversion*	No
Color correction*	No

Android Lollipop feature. Subject to possible change in future releases of Google™ Android™.

Device-to-device communications (local)

Bluetooth® wireless technology

Bluetooth® profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Generic Attribute Profile Client/Server over LE Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.2 Object Push Profile v1.1 Personal Area Networking Profile v1.0 Phone Book Access Profile FTP v1.1 (server role)
Core version and supported core features	Version 4.1
Connectable devices	Products that support at least one of the profiles listed above. Bluetooth 4.1 accessories generally require installation of a supporting application.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11b/g/n and Wi-Fi® Wi-Fi Direct®, Wi-Fi Protected Setup, Wi-Fi CERTIFIED Passpoint™, Wi-Fi CERTIFIED Miracast™
Connectable devices	Wi-Fi® access points Wi-Fi Direct® compatible devices
Frequency band	2.4 GHz
Data transfer rate	Up to 150 Mbit/s
Security	Open Authentication Shared Authentication EAP-SIM EAP-AKA EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-UAPSD
QoS	WMM

DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	***M-DMS – Mobile Digital Media Server*** Media Types: images, music and video Summary: The digital media server exposes the media files in your device to a Wi-Fi® network. The files can then be accessed from other DLNA CERTIFIED® clients. ***M-DMP – Mobile Digital Media Player*** Media Types: image, music and video Summary: You can play content stored on another device, for example, a server or a PC, directly on your device. ***M-DMC – Mobile Digital Media Controller*** Media Types: image, music and video Summary: Digital Media Controllers find content offered by a DMS or M-DMS and match it to the rendering capabilities of a DMR — setting up the connections between the DMS and DMR. ***+PU+*** Media Types: image, music and video Summary: You can play media in your device on another device, such as a TV or a PC using 2 box push technology. +PU+ is integrated in the Album, Movies and "Walkman®" applications. ***+DN+*** Media Types: image, music and video Summary: You can download content stored on another device, for example, a server or a PC, and play the downloaded content directly on your device. ***+UDO+*** Media Types: image, music and video Summary: A media server uploading function that allows media files to be uploaded to Xperia devices from other DLNA certified clients.
Supported Bearers	Wi-Fi® Wi-Fi Direct®
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

Messaging

MMS (Multimedia Messaging Service)
According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS, Wi-Fi®
Character sets	BIG5 Traditional Chinese GB2312 Simplified Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and STARTTLS
HTML mail	Yes (read only)

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL) v1.0

- 3GPP™ Control Plane location (incl. Emergency location), only supports E911

Supported satellite systems:

- GPS

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	AAC (AAC-LC, AAC+, eAAC+, AAC-ELD)	3GPP (.3gp, 3gpp), MP4 (.mp4, .m4a), ADTS (.aac)
	ALAC	MP4 (.m4a)
	AMR-NB, AMR-WB	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4a), AMR (.amr, .awb)
	FLAC	FLAC (.flac), Matroska (.mka)
	MIDI	SMF (.mid), XMF (.xmf), Mobile XMF (.mxmf), OTA (.ota), RTTTL (.rtttl), RTX (.rtx), iMelody (imy)
	MP3	MP3 (.mp3)
	PCM	WAV (.wav)
	Vorbis	OGG (.ogg), Matroska (.mkv)
	WMA	ASF (.wma)
Audio Recording	Encoder format	Supported in file format
	AAC (AAC-LC, AAC+, AAC-ELD)	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4a)
	AMR (AMR-NB, AMR-WB)	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4a), AMR (.amr)
Image Playback	Decoder format	Supported in file format
	BMP	BMP (.bmp)
	GIF	GIF (.gif)
	JPEG	JPEG (.jpg, .jpeg)
	PNG	PNG (.png)
	WebP	WebP (.webp)
Image Capture	Encoder format	Supported in file format
	JPEG	JPEG (.jpg)

Video Playback	Decoder format	Supported in file format
	MPEG-4	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4v), Matroska (.mkv), AVI (.avi), Xvid (.xvid)
	H.263	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4v)
	H.264	3GPP (.3gp, .3gpp), MP4 (.mp4, .m4v), Matroska (.mkv)
	H.265*	MP4 (.mp4, .m4v)
	VP8	WebM (.webm), Matroska (.mkv)
	VP9	WebM (.webm)
Video Recording	Encoder format	Supported in file format
	MPEG-4	3GPP (.3gp), MP4 (.mp4)
	H.263	3GPP (.3gp), MP4 (.mp4)
	H.264	3GPP (.3gp), MP4 (.mp4)
Audio	Streaming transport	HLS HTTP progressive streaming RTSP
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM v1.0 Marlin DRM Widevine Level 3 PlayReady DRM (available in specific regions)

* H.265 is not available in all markets.

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12.0

Microsoft® Exchange ActiveSync® protocol version 14.0

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Google Chrome™ for Android™ is pre-installed in markets/regions where no restrictions apply.

Related information:

https://play.google.com/store/apps/details?id=com.android.chrome

Memory in Android™ devices

To use Android devices efficiently, users should be aware of the different types of device memory. This knowledge is important in order to understand, for example, where data such as music, photos and videos is saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

Information regarding memory presented in this section may be useful to developers when optimising applications for mobile devices.

Generally, all Android devices share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your device uses an external SD card or an internal memory chip. Any information specific to the particular device model described in this White Paper is noted as such.

Types of memory

The types of memory described and numbered below are consistent with the terminology used in Sony mobile device menus and in other content relating to 2015 Xperia™ devices:

1. **Dynamic Memory** (also known as RAM) is used by applications that run when the device is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. The Android operating system automatically closes applications and services that are not being used.

   However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), device speed will eventually be impacted. This is the main reason that a device cannot be indefinitely upgraded to newer releases of Android™.

   If you experience problems with RAM, for example, if the device runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimise the use of apps that run all the time. Social networking apps that connect and update their data online and animated backgrounds are examples of apps that are always running and affect RAM performance. To minimise RAM issues, you could also consider using a static wallpaper instead of a live wallpaper.

   To see which apps and services are currently active, go to **Settings > Apps > Running**. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

   You should also be aware that if you update the device to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features. As a result, the device may run slower after an update.

   The Xperia™ E4 Dual has 1 GB of RAM available to the Android OS and any installed applications. 200 MB of the total RAM is in use during normal operation when the user starts using the device out of the box.

2. **System Memory** (also known as "System partition" or "/system") is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. **Internal Storage** is referred to as "working" memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

   This type of memory is used to store all application downloaded from the Google Play™ Store (and other sources) as well as their settings and data (such as emails, messages and calendar events, for example). All applications have an allocated area for application data. Memory dedicated to an application is inaccessible to other applications.

   Some game applications also store content such as game music and game level information outside their own designated area. In most cases, an application can choose to save its data in a location of its own choosing (outside the protected application settings area). Generally, such content is not deleted when an application is uninstalled; it must be removed manually by connecting the device to a computer with a USB cable, or by using a file manager application.

   Internal storage is also used for all added user content. For example, photos taken using the device's camera, media files downloaded from the Internet and file transfers are stored in this area. Typical user content includes:
   • photos
   • movies
   • music
   • Email attachments

   Internal Storage will tend to fill up as a result of normal usage. Devices with a large initial Internal Storage can handle more applications and store more user content.

   If the Internal Storage starts to get full, the device slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Internal Storage. If not, you should consider removing some apps that you seldom use, or move content that you do not frequently access to external storage.

   You can see approximately how much Internal Storage is free in **Settings** > **Storage** > **DEVICE MEMORY**. You can also view more details about how much memory is used by applications under **Settings** > **Apps**. In the Xperia™ E4 Dual, about 5 GB of Internal Storage is available out of the box.

   Please note that in Sony Mobile 2015 products, "Internal Storage" is now the combination of what was previously known as "Device Memory" or "Phone Memory" (for applications and their data – also previously known as "/data") and "Internal Storage" (for user's content – also previously known as "/sdcard"). The changes in Internal Storage were made so that memory usage could be more flexible and to allow encryption of user content.

Memory card slot
Some products include both a large internal memory and a built-in memory card reader. Android manages devices with a built-in memory card reader and internal memory differently from a device that includes only a built-in memory card reader.

Since most applications expect only a single location for storage, such applications will not generally allow you to SAVE anything to the memory card (i.e., they do not offer the option to choose a storage location). However, some applications (for instance, the Sony Mobile "Camera" application) may actually allow you to do so. Other applications, for example, backup applications such as the Sony Mobile "Memory" application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to reading from an external SD Card, you will be able to access content (for example, videos, photos and music) on a memory card inserted in this slot without any special consideration since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called "External Card" or "SD Card".

4. **SD Card** (known as "/ext_card" from a programmer's point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2015 Sony Mobile products. As described in the previous section, this External Card memory is generally more limited in that any application can read from it, but many applications cannot save to this card. Only a few applications, including backup applications and file manger applications, have the capability to save to this card.

Backing up data to different memory types
Generally, you should not save photos, videos and other personal content solely on the internal memory of a device. If something should happen with the hardware, or if the device is lost or stolen, the data stored on the device's internal memory is gone forever.

In a device where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ E4 Dual supports Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your device and a Windows® PC. For Apple™ Mac® computers, a special application called Sony™ Bridge for Mac is available with built-in support for MTP. This application can be downloaded from the Xperia™ E4 Dual support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from the Google Play™ Store. They can normally be downloaded again after you have set up your Google account to work in a new device (or in a device where the memory has been completely erased).

Note 1:
Some Android devices, including Sony Mobile devices from 2012 and Sony Ericsson devices from 2011 and earlier, do not use a single "Internal Storage" for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area ("/data") and the user content area ("/sdcard"), with the result that user content can build up and reach this limit. When the user content reaches this limit, no additional data can be added using any application. For example, the camera application would no longer be able to capture additional photos even if a considerable amount of free space was available in the application area. This limit also applies to the application area. Downloading and installing new applications would not be possible even if there was enough free memory in the user content area.

Note 2:
Some devices with integrated storage have abandoned the distinction between the application area and the content area when it comes to a Factory Data Reset. As a result, there is no option in such devices to perform a Factory Data Reset and preserve content. In such devices, all content is completely deleted from the device when a reset is performed.

In contrast, Sony Mobile's memory integration solution makes it possible to preserve user content in this situation. Therefore, when performing a Factory Data Reset, the default action will still be to only remove applications and their data, and an option box must be checked if all content is to be removed as well (as might be desirable when selling the device second-hand).

Note 3:
For a developer, it is important to note that from a programming point of view the location names used to refer to the different memory areas described in Note 1 are still valid, i.e., the area used for applications ("/data") is still present, as is the area used for content ("/sdcard").

In reality, "sdcard" is a "symbolic link" to "/data/media". However, from inside an Android application, "/sdcard" can still be used. For example, you can use "sdcard/DCIM/100Android" to find all camera images. The continued use of "/sdcard" to access the content area ensures compatibility across different products and Android releases in this regard.

Trademarks and acknowledgements

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Visit *www.sonymobile.com* for more information.